The Power of Plan B: The Impacts of Over-The-Counter Availability of Emergency Contraception

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PRELIMINARY AND INCOMPLETE

Abstract

In November 2006, the prevalent brand of emergency contraception, Plan B, became available over-the-counter at pharmacies for women aged 18 or older. Our paper first uses Nielsen retail scanner data to look at how store-level sales of emergency contraceptive pills and other contraceptives were impacted by the federal policy. Then, our paper investigates the impacts of this policy on behavior, fertility, and female economic outcomes. Using time-series and difference-in-difference methods, we observe no substitution away from other forms of contraception or increases in the frequency of sexual activity. We see significant declines in fertility rates, particular in younger, unmarried women, as well as women in states that had a relatively high abortion rate prior to November 2006. Using a cumulative exposure model, we find that Plan B availability had a profound impact on female education and labor market outcomes.

1 Introduction

Emergency contraception has received copious amounts of attention in the United States over the past decade. Plan B, the prevalent brand of the emergency contraceptive pill (ECP), was first introduced nationally in July of 1999 and was only attainable via prescription. On November 6, 2006, after a ruling from the FDA, Plan B became available over-the-counter (OTC) at pharmacies for women aged 18 or older.[1] Emergency contraceptives are birth control measures that may prevent pregnancy if taken after sexual intercourse. The effectiveness of the ECP is expressed as a percentage reduction in pregnancy rate for a single use of the ECP. In the United States, the FDA reported Plan B to be 89% effective, explaining the effectiveness by stating, "Seven out of every eight women who would have gotten pregnant will not become pregnant."[2]

Many of the discussants of the ECP have outlined the potential benefits and consequences of expanded access of ECPs. To a first degree, expanded use of the ECP will reduce pregnancy rates, all else equal. A second stage consequence of expanded ECP availability requires looking at changes in behavior. For individuals who derive utility from the act of sexual intercourse but view potential pregnancy as a cost, usage of the ECP effectively reduces the expected cost of engaging in sex by reducing the likelihood of getting pregnant. Hence, such individuals may increase the frequency with which they have sexual intercourse. Additionally, ECP users may reduce their usage of other forms of contraceptives, such as condoms, if they view the ECP as a substitute. Thus, the impacts of OTC availability of ECPs on fertility rates are theoretically ambiguous.[3]

[1] Additionally, there were nine states that adopted some form of ECP-related policy prior to the 2006 federal policy. These early-adopter states are Alaska, California, Hawaii, Maine, Massachusetts, New Hampshire, New Mexico, Vermont, and Washington.

[2] To better understand this statement, take the following example: If a woman has unprotected sex during the middle two weeks of her menstrual cycle, she has approximately an 8% chance of getting pregnant; thus, out of 1250 women, we would expect 100 to get pregnant. If instead these women had used an ECP, then only 11 would have gotten pregnant, for a net pregnancy rate of $\frac{11}{1250} \approx .88\%$. As it now stands, there are no reported differences in the efficacy of Plan B by age.

[3] Though not discussed in our paper, the expanded ECP availability also has implications for the spread of sexually transmitted infections (STIs). ECPs do not reduce the probability of receiving a STI after sexual intercourse, unlike some traditional contraceptives, such as condoms. Thus, if expanded ECP availability

Our paper first uses Nielsen retail scanner data to look at how store-level sales of ECPs and other contraceptives were impacted by the federal policy. Then, our paper looks at several possible behavioral channels impacted by the federal policy, as well as the impacts of this policy on pregnancy and birth rates. Lastly, we investigate the impacts of ECP availability on female education and labor market outcomes. Our identification uses the timing of the federal policy, while no other unobservable factors are known to have affected our outcome variables, combined with the rapid diffusion of ECPs. We find evidence of a significant negative trend break in pregnancy and birth rates after November 2006, the first month ECPs were available OTC nationally. Meanwhile, we observe no changes in the frequency of sexual activity nor in the sales of condoms.

We additionally rely on another layer of variation based on hypotheses involving the differential costs women affiliate with pregnancy. For example, married women may view potential pregnancy as a small cost of engaging in sex relative to unmarried women. Women who associate large costs to pregnancy, but otherwise desire sex, should be relatively more responsive to increased ECP availability. On the other hand, women who desire pregnancy should be completely unresponsive to increased ECP availability. We see that the trend break in pregnancy rates are driven by states that had relatively high abortion rates from 1996-2005. For both pregnancy and birth rates, younger women showed significant declines in response to the policy relative to older women. Married women had small, insignificant declines in pregnancy rates in response to the policy, while unmarried women experienced significant declines in pregnancy rates.

Lastly, we use a cumulative exposure model to evaluate female education and labor market outcomes.

The remainder of the paper proceeds as follows. Section 2 discusses the background of the ECP and Plan B related policies and production, as well as a review of prior relevant literature. Section 3 introduces our identification strategy and assumptions. Section 4 describes

leads to increased sexual activity and/or substitution away from condoms, then the spread of STIs should monotonically increase.

our data - the Nielsen retail scanner data, the American Time Use Survey (ATUS), the Behavioral Risk Factor Surveillance System (BRFSS), and the CDC Natality data. Section 5 presents our empirical results. Section 6 concludes with our comments and remarks.

2 Background

History of Emergency Contraceptive Pills

Emergency contraceptive pills are drugs that disrupt or delay ovulation or fertilization, which are necessary for pregnancy. The most common type of ECP is the progestin-only method, which is a product that carries many different names worldwide, including Plan B in the United States and Canada. ECPs contain higher doses of estrogens or progestins, or both, than those found in regular oral contraceptive pills. When taken after unprotected sexual intercourse, the higher hormonal dosage may prevent pregnancy from occurring. The ECP offers women an effective way to avoid pregnancy after sexual intercourse, so long as it is taken within 5 days of having intercourse.

The successful use of oral high-dose estrogen pills as a post-coital contraceptive was first discovered by gynecologist John McLean Morris and biologist Gertrude Van Wagenen in 1966. In the United States, the progestin-only Plan B was approved on July 28, 1999, by the FDA for prescription access only. On August 24, 2006, the FDA approved over-the-counter access to Plan B from pharmacies for women aged 18 years or older. On November 6, 2006, Barr Pharmaceuticals, the primary producer of Plan B, announced initial shipments of OTC Plan B would be made available across the U.S. by mid-November 2006. On March 23, 2009, a U.S. judge ordered the FDA to allow men and women aged 17 years or older to acquire Plan B OTC without a prescription, and on April 30, 2013, the FDA approved Teva Pharmaceutical Industries Plan B One-Step for sale without a prescription to anyone aged 15 years or older. Less than two months later, in June 2013, Teva's Plan B One-Step became available without a prescription for everyone, regardless of age, and was moved from pharmaceutical counters into regular store aisles. In addition to these federal policies, nine states (Alaska, California, Hawaii, Maine, Massachusetts, New Hampshire, New Mexico, Vermont, and Washington) approved some form of ECP availability from 1997 to 2006.

Prior Literature on Oral Contraceptives

Several studies have analyzed how the introduction of oral contraceptives in the United States during the 1960s affected women's fertility and economic outcomes. Goldin and Katz (2002) use variation in access to the pill by state and cohort to study how women's careers and family planning had been altered with the increased ability to reduce likelihood of getting pregnant. Bailey (2006) found that access to the pill reduced fertility in young adults and increased labor force participation. Guldi (2008) also finds evidence suggesting the pill reduced fertility in minors. Ananat and Hungerman (2008) suggest that the pill had a larger impact on households of above average socioeconomic status who had more to gain from controlling the timing of having a child.

While the impacts of availability of the pill in the United States has received considerable attention in academia, prior research on the effects of the ECP availability in the United States remains mixed and inconclusive. A working paper by Oza (2009) uses a difference-in-differences strategy, comparing early-adopter states to states who adopted OTC access in light of the 2006 FDA ruling; Oza suggests that improved access to Plan B accounts for as much as 37.2% percent of the decline in abortions and 17.8% of the increase in STIs between 2005 and 2007 among women aged 15 to 29. On the other hand, Gross et. al (2014) find no evidence that expanded ECP access had an impact on total births and abortion rates; these authors first compare EA states to each other, relying on the timing of the adoption of the state-policy, then similar to Oza (2009), use the EA states as controls for the states who adopted OTC access in response to the federal policy. Also relying on a comparison of EA states to late-adopter state, a working paper from Zuppann (2012) suggests that OTC availability of the ECP increased the number of sexual partners individuals had, increased sexual acts, increased STI rates, and, under certain conditions, delayed marriages and lowered single motherhood rates.

A working paper from Cintina (2013) looks solely at the states of Washington and its neighbors Idaho and Oregon. Cintina finds that increased access to the ECP in Washington led to a 5 to 7% decrease in abortion rates and 2% decrease in pregnancy rates, with potential spillover effects into Idaho, but not Oregon. Also focusing solely on the state of Washington, Durrance (2013) uses within-state county adoption variation to find increases in STD rates (gonorrhea) but no changes in abortion or birth rates.

A more recent working paper from Cintina and Johansen (2014) relies exclusively on late-adopter states' responses to the 2006 federal policy, comparing abortion rates of 18 and 19 year old women to women aged 15, 16, and 17. The authors find moderate reductions in abortion rates in 18 and 19 year old women relative to 15-17 year old women, with no change in abortion rates for women aged 20-24.

Prior to the federal passing of OTC access of ECPs, numerous small-scale, randomized-controlled medical trials were conducted to evaluate take-up rates of ECPs and potential consequences. A study from Raymond et al. (2006) randomly assigned one of two methods of access to ECPs to sexually active women aged 14-24 and followed the participants for 1 year; they found that enhanced access to ECPs substantially increased use of ECPs and had no adverse impact on STIs, but also did not lead to reductions in pregnancy rates. A similar study from Raine et al. (2005) assigned women to either pharmaceutical access, clinical access, or advanced provision of ECPs; the authors found no differences in pregnancy rates, STIs, contraceptive use, or sexual behaviors between the groups. Only participants in the advanced provision access treatment used ECPs more frequently, but the frequency of unprotected intercourse was similar between the groups. Gold et al. (2004) found that providing advanced ECPs to adolescents did not increase frequency of unprotected intercourse or decrease condom or hormonal contraceptive use. A survey of 23 prior randomized-control medical trials suggests that increased access of ECPs enhanced use of ECPs but did not reduce unintended pregnancy rates (Raymond et al. 2007).

Our contribution

Our paper contributes to the prior ECP literature in several important manners. First, we provide direct, first-stage evidence of the impacts of the federal policy on sales of ECPs using Nielsen retail scanner data.[4] The major advantage of our contribution here is that the first-stage evidence is broken down by state. What we observe is that EA states were just as responsive to the federal policy in terms of relative sales to those states that did not have a prior policy. This suggests that at a minimum, EA states cannot be used as a comparison group to late adopter states when analyzing the federal policy.

One reason EA states' sales may have responded to the federal policy is that the federal policy acted as an information shock; despite the fact that EA states already had some sort of ECP policy in place, the federal policy increased awareness of the drug, and thus sales increased. A different, supply-side explanation says that the EA states' policies were simply ineffective such that the EA states were not any different than their lade adopter counterparts in terms of ECP availability prior to the federal policy. All of the EA state policies required some form of collaborative practice and/or completion of a course, should the pharmacy choose to carry the ECP. Unfortunately, since the Nielsen scanner data only dates back to 2006, we cannot observe sales in response to the majority of the EA state policies. However, the consequence of the latter explanation says that one cannot rely on the EA state policies to draw a conclusion on the impacts of increased ECP availability.

We then provide evidence on the direct behavioral changes in response to the 2006 federal policy, many of which are necessary components to conclude the findings from the prior literature. For example, if increased availability of ECPs did cause significant increases in STIs, then this implies that OTC availability caused people to engage in more sexual activity and/or switch away from other forms on contraceptives which protect against STIs.

[4] Zuppann (2012) uses annual, national data from the National Survey of Family Growth to show that usage rate of ECPs increased in 2007 and 2008 relative to 2006 for women aged 15-29. Gross et al. (2014) provide a figure of weekly, national sales of Plan B, which shows a significant spike in OTC sales in November, 2006, with a general increase in sales in every subsequent month through 2008.

Lastly, in order to draw conclusions about the effects of the federal policy, we compare differences in trends of our outcome variables before and after the policy across different demographics and states, as opposed to comparing simple mean differences. As we discuss further in the appendix, we find that the results to the mean difference-in-differences specifications are sensitive to the selection of number of months pre and post policy. This sensitivity is driven by a relatively flat pre-trend compared to the post-policy trend, making any estimated mean difference-in-differences effect larger for longer windows or windows that have relatively more months post-policy.[5]

3 Data

We draw inferences across different outcome variables from numerous data sets, including the Nielsen Retail Scanner data, the American Time Use Survey (ATUS), the Behavioral Risk Factor Surveillance System (BRFSS), and the Vital Statistics (Natality) Data.

The Nielsen Retail Scanner data consist of weekly pricing, volume, and store environment information generated by point-of-sale systems from more than 90 participating retail chains across all U.S. markets. The data set spans the years of 2006 to 2011, and contains sales of over 35,000 participating grocery and drug stores, covering more than half of the total sales volume of U.S. grocery and drug stores. We use the Nielsen Retail Scanner to see how ECP and condom sales responded to the 2006 federal policy.

The American Time Use Survey (ATUS) measures the amount of time people spend doing various activities, such as paid work, childcare, volunteering, and socializing. ATUS data files include information collected from over 136,000 interviews conducted monthly by the U.S. Census Bureau from 2003 to 2012. ATUS respondents are interviewed only one time about how they spent their time on the previous day, where they were, and whom they were with. We use the ATUS to look at how many minutes participants spent engaging in "Personal/Private activities" during their diary day. The examples of daily activities

[5]These differences in window sizes may also contribute to the contradictory findings of earlier research, despite the fact that many of the earlier papers draw upon identical variation and/or data sets.

that resulted in the coding of “Personal/Private activities” include “having sex, making out, cuddling partner in bed, necking, private activity - unspecified, personal activity - unspecified, spouse gave me a massage”. We define the outcome variable $minsex_{ast}$ as the number of minutes an age group a in state s at time t engaged in “Personal/Private activities” during their diary day to see if number of minutes spent changed in response to the federal policy. Time t is normalized to number of months before/after November 2006, and sample inverse probability weights are used to make responses generalizable to the population.

The Behavioral Risk Factor Surveillance System (BRFSS) is currently the world’s largest, on-going telephone health survey system. Initiated in 1984 by the Centers for Disease Control and Prevention (CDC), the BRFSS is a cross-sectional survey that state health departments conduct monthly to collect prevalence data among adults regarding their risk behaviors and preventive health practices. One interview question administered across all states and months of interest asked women aged 18 to 44 if they were pregnant during the time of the interview. Using this question, we create the outcome variable $Pregnant_{ast}$ to capture the pregnancy of age group a in state s at time t. As is common with the majority of the literature, we define pregnancy rate as the number of pregnancies per 1000 women. A specification we make is to set time t to be the number of months before/after August 2007, or nine months after ECPs became available OTC in November of 2006. Unfortunately, the BRFSS does not inquire how long the woman had been pregnant, so any woman who responded as being pregnant from November 2006 to July 2007 may or may not have conceived her child during a time when ECPs were available OTC. Our specification guarantees that pregnant women carry a baby that was conceived during a month that ECPs were available OTC. We consider two alternative specifications in the appendix, setting the months of April 2007 and June 2007 as the first month of treatment; though we identify and discuss small dissimilarities between the specifications, interpretations of the results are largely the same as those presented in the main part of the paper. We use sample inverse probability weights. Over 350,000 women responded to the pregnancy question during the 24 months before/after

August 2007.

The CDC Vital Statistics (Natality) data contains information on all births registered in the 50 United States and the District of Columbia. State laws require birth certificates to be completed for all births, and federal law mandates national collection and publication of births and other vital statistics data. Combined with population measures (FROM WHERE??), we use the Natality data to create the outcome variable BR_{at} which represents the number of births per 1000 women of age group a at conception time t. Information from the Natality data (WHAT INFORMATION??) allows us to identify the conception month of the baby; thus, we analyze birth rates by conception month, with $t = 0$ for November 2006. Birth rate cells are weighted by total number of births within that cell.

4 Identification Strategy

4.1 Trend-break model

We borrow from the trend-break model used in Jayachandran et al. (2011) in order to compare differences in trends pre and post policy, pending the availability of data:[6]

$$Y_{ast} = \beta_0 + \beta_1 t + \delta_0 Post_t + \delta_1 Post_t \times t + D_s \times t + X_{st} + D_a + D_{Cmonth} + D_s + \epsilon_{ast} \quad (1)$$

Y_{ast} represents the outcome variable of interest for age group a, in state s, at time t. Time t is normalized to represent the number of months before/after the treatment is in effect. Recall that shipments of OTC ECPs began in November 2006; for outcome variables immediately impacted by the OTC availability, such as sexual activity, t is set equal to 0 on November 2006. On the other hand, as discussed in further detail in the subsequent Data section, we have to make certain assumptions about treatment months for the pregnancy and birth outcome variables. $Post_t$ is equal to 1 when $t \geq 0$ and is equal to 0 when $t < 0$. X_{st}

[6]For the Natality data, state level data is unavailable publicly for years after 2004. Thus, specifications using the Natality data do not include state dummies, state-time trends, or state-specific business cycle controls.

represents a series of non-linear controls for business cycles.[7] As discussed in the literature review, one may be concerned of the cyclicality of fertility, particularly with the presence of the Great Recession in 2008. D_s, D_a, and $D_{C-month}$ are dummy variables for state, age, and calender month, respectively, and ϵ_{ast} represents the error term. The interaction term between D_s and t captures any state specific linear time trends through the window of analysis.

The primary right-hand side variables of interest in this specification are $Post_t$ and $Post_t * t$. $Post_t$ captures the "jump" in Y_{ast} for the first month of treatment, where $t = 0$. $Post_t * t$ is equal to 0 for months prior to the treatment being in place, and is otherwise equal to the number of months post treatment. This term captures the difference between the post and pre-trend in Y_{ast}. If we expect the presence of treatment to immediately impact the outcome variable, then we would expect to find a significant estimate for $Post_t$. A significant estimate for $Post_t * t$ implies the presence of a trend break at the treatment month. Unless otherwise specified, all analyses are conducted with a window of treatment month +/- 24 months, such that $-24 \leq t \leq 24$.

4.2 Difference-in-differences

5 Results

Sales of ECPs

Figure 1 plots weekly sales of ECPs from 2006 to 2009, both nationally and parsed by early-adopter (EA) states versus states that did not have an ECP-related policy in place prior to the August 2006 FDA ruling. Panel A displays total sales, while panel B plots relative sales (sales divided by state annual population). Figure 1 tells us two things. First, sales of ECPs responded drastically in November 2006 in response to the federal policy. Second, relative sales of ECPs rose nearly as much in EA states as they did in the other 41 states.

[7] These controls include income per capita (and its squared term), unemployment (UE) rates (and its squared term), and labor force participation (LFP). When state level data is available, we use state, monthly UE and LFP rates for women aged 18-44 as observed in the monthly CPS. For national level data, we use national monthly measures.

As discussed previously, this suggests that EA states cannot be used as a comparison group to late adopter state when analyzing the federal policy. All subsequent analyses will pool individuals from all states together, though we also run our specifications by EA and late adopter states in the appendix, and the results are largely the same.

FIGURE 1: INSERT SALES OF ECP BY EA AND LA FIGURE HERE

Behavioral responses

Figure 2 plots relative national weekly sales of ECPs and condoms from 2006 to 2009. While one can clearly see that sales of ECPs increased post-November 2006, there does not appear to be any significant changes in the relative purchases of condoms. If one would expect condom usage to be substituted away from in favor of ECPs, then the increased sales of ECPs should crowd out the purchases of condoms, which does not appear to be the case here.[8]

FIGURE 2: INSERT SALES OF ECP AND CONDOMS FIGURE HERE

We turn to the ATUS to see if people engaged in more sexual activity in response to the federal policy. Our sample of interest includes women aged 15-44 who were interviewed within the November 2006 +/- 24 month window, giving us a total of 14,499 women. The mean of the outcome variable *minsex* (defined in Section 4 - Data) for this sample is .5875, or approximately 35 seconds per 24 hours. Results from our primary specification are given below in Table 1. Column 1 presents the results from the aforementioned sample, column 2 for women aged 15 to 29, column 3 for women aged 30-44, column 4 for unmarried women, and column 5 for married women. Recall that one would expect to see differences in responsiveness to the ECP policy based on the costs associated with getting pregnant; for example, older women may be less responsive than younger women, or married women may be less responsive than unmarried women. The primary right-hand side variables of interest

[8]When regressing weekly national sales of condoms on weekly national sales of ECPs, we get a point estimate of POINT ESTIMATE with a p-value of P-VALUE. When regressing weekly store sales of condoms on weekly store sales of ECPs with store fixed effects, we get a point estimate of POINT ESTIMATE with a p-value of P-VALUE.

are $Post_t$ and $Post_t * t$, labeled "Post Nov2006 dummy" and "Difference in trends", respectively. Across all samples, we see no discernible trend break. We do see a point estimate of .244 on $Post_t$ for women aged 15-29, meaning we predict an immediate increase of .244 for *minsex* at the passing of the policy, but this estimate is both statistically insignificant (p-value = .666) and economically meaningless, coming out to a predicted increase of approximately 15 seconds per 24 hours in *minsex*. Across all samples, we cannot reject the hypothesis that the point estimates for $Post_t$ and $Post_t * t$ are 0 at the 90% level.

Table 1: Sexual frequency (in minutes/24 hours)

	(1)	(2)	(3)	(4)	(5)
	All	Ages 15-29	Ages 30-44	Not married	Married
Difference in trends	0.001	-0.001	-0.009	-0.003	0.009
	(0.032)	(0.048)	(0.042)	(0.051)	(0.037)
	[0.968]	[0.988]	[0.824]	[0.947]	[0.814]
Post Nov2006 dummy	0.022	0.244	-0.117	-0.522	0.436
	(0.361)	(0.561)	(0.409)	(0.558)	(0.306)
	[0.951]	[0.666]	[0.775]	[0.354]	[0.161]
Linear time trend	0.022	0.007	0.054	0.003	0.049
	(0.027)	(0.046)	(0.034)	(0.043)	(0.029)
	[0.405]	[0.879]	[0.118]	[0.937]	[0.101]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	12041	4668	7373	6309	6615

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01
2. p-values for point estimate equal to 0 presented in brackets.
3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Fertility outcomes

Lastly, we turn our attention to pregnancy and birthrates. Defined in Section 4, our primary outcome variables are $Pregnant_{ast}$ and BR_{at}.

Table 2 presents the results using our primary specification (1) for $Pregnant_{ast}$ from the BRFSS. The mean pregnancy rate for our entire sample is 40.4 pregnancies per 1000 women. First, in column 1, we note a statistically significant ($\alpha = .05$) negative trend break in pregnancy rates for the entire sample of women aged 18 to 44, with a statistically insignificant jump of 1.817. When we parse our results by women aged 18 to 29 versus women aged 30 to 44, we see that it is the relatively younger women who are driving the significant trend break in pregnancy rates; the point estimate on $Post_t * t$ for women aged 18 to 29 is -2.148, and is statistically significant at the 1% level, while the corresponding point estimate for women aged 30 to 44 is actually positive (.085) and statistically insignificant. Similarly, when we split the results by unmarried versus married women, we see that unmarried women are driving the trend break in pregnancy rates (-1.410 vs. -.219), with the point estimate on $Post_t * t$ for unmarried women being statistically significant at the 5% level.

Table 2: Number of pregnancies per 1000 women

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.819**	-2.148***	0.085	-1.410**	-0.219
	(0.371)	(0.714)	(0.363)	(0.630)	(0.443)
Post Aug2007 dummy	1.817	10.648	-3.490	7.913*	-1.630
	(3.633)	(7.286)	(3.108)	(4.547)	(4.568)
Linear time trend	0.446	0.493	0.414	0.580	0.341
	(0.387)	(0.760)	(0.252)	(0.625)	(0.478)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	63573	27432	36141	52162	50931

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01
2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

The direct interpretation of these results is that younger, unmarried women saw a statistically significant negative trend break in their pregnancy rates in the 24 months subsequent to the federal policy relative to the 24 months prior. Women who use any form of contraceptive, including the ECP, are women who have costs associated with pregnancy. We would expect women who have higher costs associated with pregnancy to be relatively more responsive the federal policy, and thus, it is unsurprising that we see pregnancy rates for unmarried, relatively younger women responding.

Table 3 presents the results of our specification across different states, parsed into four quantiles of abortion rates; for example, column 1 presents the results from specification (1) for women who reside in states that had average abortion rates from 1996-2005 in the bottom 25^{th} percentile. The difference in trends becomes more negative as we move from low abortion states to high abortion states, and is statistically significant ($\alpha = .05$) for states in the 75^{th} and above percentile. While the point estimates for $Post_t$ are positive for three of the four bins, they are not statistically different from zero, meaning we do not predict an immediate jump in pregnancy rates in the first month of treatment. The direct interpretation here is that states in the top 25^{th} percentile of abortion rates from 1996-2005 had a significant trend break response to the federal policy.

Table 3: Number of pregnancies per 1000 women by state abortion quantiles

	(1) Below 25th	(2) 25th-50th	(3) 50th-75th	(4) 75th+
Difference in trends	-0.132	-0.621	-0.904	-1.310**
	(0.707)	(0.713)	(0.907)	(0.571)
Post Aug2007 dummy	6.824	9.252	-7.803	2.653
	(5.771)	(9.202)	(7.988)	(4.144)
Linear time trend	-0.335	0.119	0.856	0.597
	(0.536)	(0.717)	(0.729)	(0.553)
Business Cycle Controls	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes
Observations	18629	17348	12411	15185

1. Standard errors in parentheses, clustered by state. * $p<0.10$ ** $p<0.05$ *** $p<0.01$

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Last, we consider the effects of the national policy on birth rates BR_{at}. From table 4, we see similar results for birth rates as we did with the BRFSS. That is, we see insignificant point estimates for $Post_t$ with statistically significant negative estimates for $Post_t * t$, implying a negative trend break in birth rates after the passing of the federal policy.

Table 4: Number of births per 1000 women

	(1) All Ages	(2) Ages 15-17	(3) Ages 18-23	(4) Ages 24-29	(5) Ages 30-35	(6) Ages 36-41
Post Nov2006 dummy	0.034	-0.035	0.089	-0.025	0.077	0.006
	(0.055)	(0.028)	(0.072)	(0.082)	(0.044)	(0.021)
Linear time trend	-0.004	-0.003	-0.014	-0.007	0.010	0.004
	(0.009)	(0.004)	(0.012)	(0.015)	(0.007)	(0.005)
Difference in trends	-0.027**	-0.008	-0.029**	-0.029*	-0.029***	-0.015***
	(0.010)	(0.005)	(0.013)	(0.016)	(0.008)	(0.005)
Nonlinear Control of Business Cycles	Yes	Yes	Yes	Yes	Yes	Yes
Mother's Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Month of Birth Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3645	405	810	810	810	810

Standard errors clustered by month of birth weighted by number of live births.

Interestingly, we see a statistically insignificant trend break for moms aged 15 to 17 years old. This may be a product of the federal legislation making the ECP available OTC only to women aged 18 and older. An important note to make is that these age bins are split by the mother's age at the time the birth certificate was completed, meaning the conception month came when the mom was even younger. We hesitate to draw any strong conclusions by comparing 15-17 year old moms to 18+ year old moms, since it is very plausible that the 15-17 year old women, though underage, could receive the ECP OTC through other means (her friends, her partner, etc.). Nevertheless, there are undeniable additional difficulties for women aged 15-17 years old to get the ECP OTC relative to women aged 18 and older, and the significant negative trend break in moms aged 18 and older relative to moms aged 15-17 offers further suggestive evidence that the 2006 federal policy drove down pregnancy rates.[9]

Figures 3 and 4 below plot the point estimates and their 95% confidence intervals from our specified model (1) for $Post_t$ and $Post_t * t$, respectively, by 3 year age bins. For example, a point corresponding to the age of 18 represents the point estimates from (1) for women aged 17 to 19. What figure 3 shows is that there was was no discernible jump in birth rates in

[9] These teenage-related results compliment Cintina and Johansen (2014), who use a difference-in-differences strategy to see the effects of the federal policy on abortion rates for women aged 18-19 using women aged 15-16 as controls.

response to the federal policy, while figure 4 suggests that there was a statistically significant negative trend break for nearly all women of all ages, but that the estimated trend break approaches zero for older women. Again, this offers evidence suggesting that OTC ECPs reduced pregnancy and birth rates in that both the aggregate trend in birth rates sharply declined after the policy and that the decline is being driven by relatively younger adults (18-30 years old).

Figure 1: Evidence from Natality data - Coefficient on Post November 2006 by Age

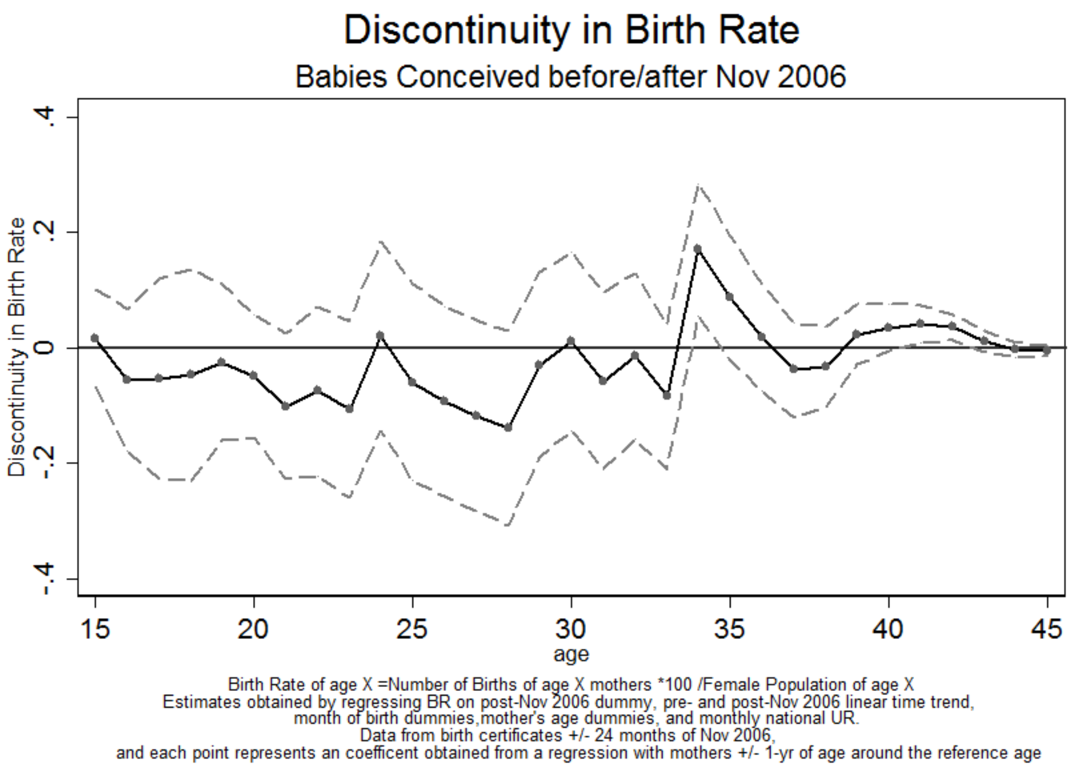
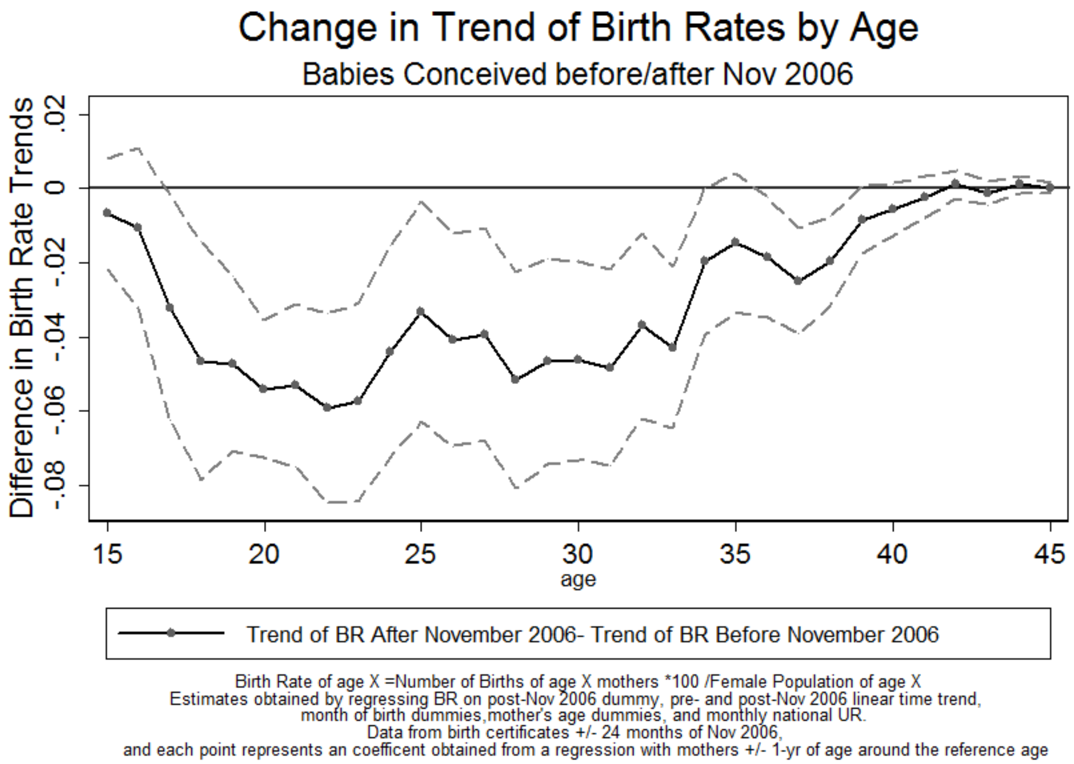


Figure 2: Evidence from Natality data - Change in trend of birth rates by Age



6 Conclusion

CONCLUDING REMARKS

7 Appendix - Further Specifications and Results

Difference-in-differences specifications

Difference-in-differences specification (where $Abortion_s$ is the average abortion rate for state s from 1996-2005):

$$y_{ast} = \alpha + Post_t + Abortion_s + Post_t * Abortion_s + X_{st} + t + D_s + D_s * t + D_{Cmonth} + D_a + \epsilon_{ast}$$

Table 5: Number of pregnancies per 1000 women - Diff-in-Diff

	(1) +/-30	(2) +/-27	(3) +/-24	(4) +/-21	(5) +/-18
Post X Abortion rate	0.089	-0.006	-0.288	-0.223	-0.095
	(0.232)	(0.208)	(0.217)	(0.262)	(0.275)
Post Aug2007 dummy	2.337	3.568	9.165	7.585	5.279
	(6.799)	(6.308)	(7.043)	(7.697)	(7.881)
Abortion rate	0.149	0.205	0.317*	0.333*	0.376*
	(0.172)	(0.162)	(0.167)	(0.177)	(0.197)
Linear time trend	-0.397**	-0.042	-0.111	-0.170	-0.272
	(0.184)	(0.204)	(0.251)	(0.227)	(0.214)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	79129	71433	63573	55825	48159

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01
2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Abortion rate is defined as the number of abortions per 1,000 women aged 15-44. Abortion rates available by state from the Guttmacher Institute. Abortion rates from 1996-2005 were only collected for the years of 1996, 1999, 2000, 2004, and 2005, so our average abortion rate statistic by state is generated by taking the average abortion rate across these five years.

Difference-in-differences specification (where $HighAbort_s$ is equal to 1 if state s was above the median abortion rate from 1996-2005):

$$y_{ast} = \alpha + Post_t + HighAbort_s + Post_t * HighAbort_s + X_{st} + t + D_s + D_s * t + D_{Cmonth} + D_a + \epsilon_{ast}$$

Table 6: Number of pregnancies per 1000 women - Diff-in-Diff

	(1)	(2)	(3)	(4)	(5)
	+/-30	+/-27	+/-24	+/-21	+/-18
Post X HighAbort	-4.362	-5.533	-9.704*	-9.249	-7.183
	(5.849)	(5.356)	(5.562)	(6.067)	(7.114)
Post Aug2007 dummy	7.054	7.060*	9.425**	8.937	7.954
	(4.379)	(3.814)	(4.633)	(5.646)	(6.489)
High Abortion State	-4.708	8.145***	-5.434	-6.431*	12.674***
	(3.109)	(2.969)	(3.378)	(3.508)	(3.655)
Linear time trend	-0.482**	-0.137	-0.238	-0.325	-0.429
	(0.202)	(0.220)	(0.278)	(0.288)	(0.317)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trends	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	79129	71433	63573	55825	48159

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Abortion rate is defined as the number of abortions per 1,000 women aged 15-44. Abortion rates available by state from the Guttmacher Institute. Abortion rates from 1996-2005 were only collected for the years of 1996, 1999, 2000, 2004, and 2005, so our average abortion rate statistic by state is generated by taking the average abortion rate across these five years.

Difference-in-differences specification:

$$y_{ast} = \alpha + Post_t + Age_a + Post_t * Age_a + Age_a^2 + X_{st} + t + D_s + D_s * t + D_{Cmonth} + \epsilon_{ast}$$

Table 7: Number of pregnancies per 1000 women - Diff-in-Diff

	(1) +/-30	(2) +/-27	(3) +/-24	(4) +/-21	(5) +/-18
Post X Age	0.046	0.042	0.038	-0.201	-0.222
	(0.216)	(0.233)	(0.230)	(0.252)	(0.228)
Post Aug2007 dummy	2.771	2.097	1.883	9.308	10.412
	(8.982)	(9.336)	(9.363)	(9.904)	(9.225)
Age	12.427***	12.360***	12.362***	12.221***	12.339***
	(0.698)	(0.667)	(0.669)	(0.662)	(0.714)
Age squared	-0.246***	-0.245***	-0.245***	-0.241***	-0.244***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
Linear time trend	-0.434**	-0.063	-0.067	-0.157	-0.288
	(0.167)	(0.189)	(0.236)	(0.198)	(0.177)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
State-Time Trends	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	79129	71433	63573	55825	48159

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Difference-in-differences specification: (where m is marital status, such that $Unmarried_m = 1$ for cells that contain unmarried women)

$$y_{astm} = \alpha + Post_t + Unmarried_m + Post_t * Unmarried_m + X_{st} + t + D_s + D_s * t + D_{Cmonth} + D_a + \epsilon_{ast}$$

Table 8: Number of pregnancies per 1000 women - Diff-in-Diff

	(1) +/-30	(2) +/-27	(3) +/-24	(4) +/-21	(5) +/-18
Post X Unmarried	-0.389	-0.932	0.323	3.358	4.599*
	(2.206)	(2.533)	(2.485)	(2.391)	(2.599)
Post Aug2007 dummy	4.715	4.299	3.439	1.916	1.868
	(2.986)	(2.660)	(3.136)	(3.050)	(3.539)
Unmarried	-40.284***	-40.382***	-41.366***	-42.853***	-42.433***
	(3.075)	(3.227)	(3.330)	(3.153)	(3.533)
Linear time trend	-0.366**				-0.218
	(0.167)				(0.191)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trends	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	128246	115773	103093	90529	78173

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

ATUS - specification (1)

Table 9: Sexual frequency (in minutes/24 hours): +/- 20 month window

	(1) All	(2) Ages 15-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	0.020	0.144	-0.114	0.062	-0.031
	(0.102)	(0.207)	(0.074)	(0.208)	(0.055)
	[0.848]	[0.491]	[0.129]	[0.769]	[0.582]
Post Nov2006 dummy	-0.078	0.535	-0.674	-0.627	0.172
	(0.530)	(0.855)	(0.497)	(0.812)	(0.313)
	[0.884]	[0.534]	[0.181]	[0.444]	[0.584]
Linear time trend	0.018	-0.100	0.149**	-0.024	0.093
	(0.103)	(0.212)	(0.069)	(0.205)	(0.056)
	[0.865]	[0.641]	[0.034]	[0.909]	[0.104]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	10112	3900	6212	5297	5553

1. Standard errors in parentheses, clustered by state. * $p<0.10$ ** $p<0.05$ *** $p<0.01$

2. p-values for point estimate equal to 0 presented in brackets.

3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 10: Sexual frequency (in minutes/24 hours) - late-adopter states

	(1) All	(2) Ages 15-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	0.027	0.017	0.017	0.037	0.022
	(0.034)	(0.056)	(0.047)	(0.051)	(0.046)
	[0.427]	[0.762]	[0.717]	[0.473]	[0.636]
Post Nov2006 dummy	-0.104	0.146	-0.292	-0.896	0.527
	(0.426)	(0.681)	(0.504)	(0.614)	(0.392)
	[0.808]	[0.832]	[0.566]	[0.152]	[0.186]
Linear time trend	0.010	-0.012	0.051	-0.025	0.052
	(0.029)	(0.052)	(0.038)	(0.044)	(0.035)
	[0.744]	[0.816]	[0.179]	[0.579]	[0.150]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	10232	3979	6253	5362	5555

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. p-values for point estimate equal to 0 presented in brackets.

3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 11: Sexual frequency (in minutes/24 hours) - early-adopter states

	(1) All	(2) Ages 15-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.146*	-0.152***	-0.143	-0.326*	0.007
	(0.073)	(0.043)	(0.128)	(0.154)	(0.012)
	[0.082]	[0.007]	[0.298]	[0.067]	[0.568]
Post Nov2006 dummy	0.595	0.833	0.577	1.530	-0.198
	(0.561)	(0.742)	(0.437)	(1.276)	(0.215)
	[0.320]	[0.294]	[0.223]	[0.265]	[0.384]
Linear time trend	0.086**	0.045	0.094	0.167**	0.031
	(0.031)	(0.046)	(0.092)	(0.071)	(0.021)
	[0.023]	[0.356]	[0.336]	[0.047]	[0.170]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	1809	689	1120	947	1060

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. p-values for point estimate equal to 0 presented in brackets.

3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 12: Sexual frequency (in minutes/24 hours)

	(1) 15-19	(2) 20-24	(3) 25-29	(4) 30-34	(5) 35-39	(6) 40-44
Difference in trends	0.068	-0.051	-0.078	-0.069	0.084	-0.079
	(0.132)	(0.036)	(0.071)	(0.095)	(0.076)	(0.070)
	[0.608]	[0.158]	[0.275]	[0.473]	[0.273]	[0.267]
Post Nov2006 dummy	-0.178	0.464	0.354	0.316	-0.025	-0.617
	(0.756)	(0.438)	(1.077)	(0.715)	(0.553)	(0.900)
	[0.815]	[0.295]	[0.744]	[0.660]	[0.964]	[0.497]
Linear time trend	-0.049	0.050	0.054	-0.006	0.052	0.118
	(0.094)	(0.047)	(0.080)	(0.076)	(0.084)	(0.072)
	[0.607]	[0.290]	[0.503]	[0.935]	[0.541]	[0.106]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1598	1208	1862	2351	2527	2495

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. p-values for point estimate equal to 0 presented in brackets.

3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 13: Sexual frequency (in minutes/24 hours) - Mean Differences

	(1) All	(2) Ages 15-29	(3) Ages 30-44	(4) Not married	(5) Married
Post Nov2006 dummy	0.020	0.245	-0.103	-0.517	0.423
	(0.366)	(0.557)	(0.397)	(0.560)	(0.336)
	[0.956]	[0.662]	[0.797]	[0.360]	[0.213]
Linear time trend	0.023	0.006	0.046	0.001	0.057
	(0.021)	(0.019)	(0.032)	(0.015)	(0.040)
	[0.259]	[0.741]	[0.154]	[0.965]	[0.160]
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	12041	4668	7373	6309	6615

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. p-values for point estimate equal to 0 presented in brackets.

3. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Figure 3: Evidence from the ATUS - Coefficient on Post November 2006 by Age

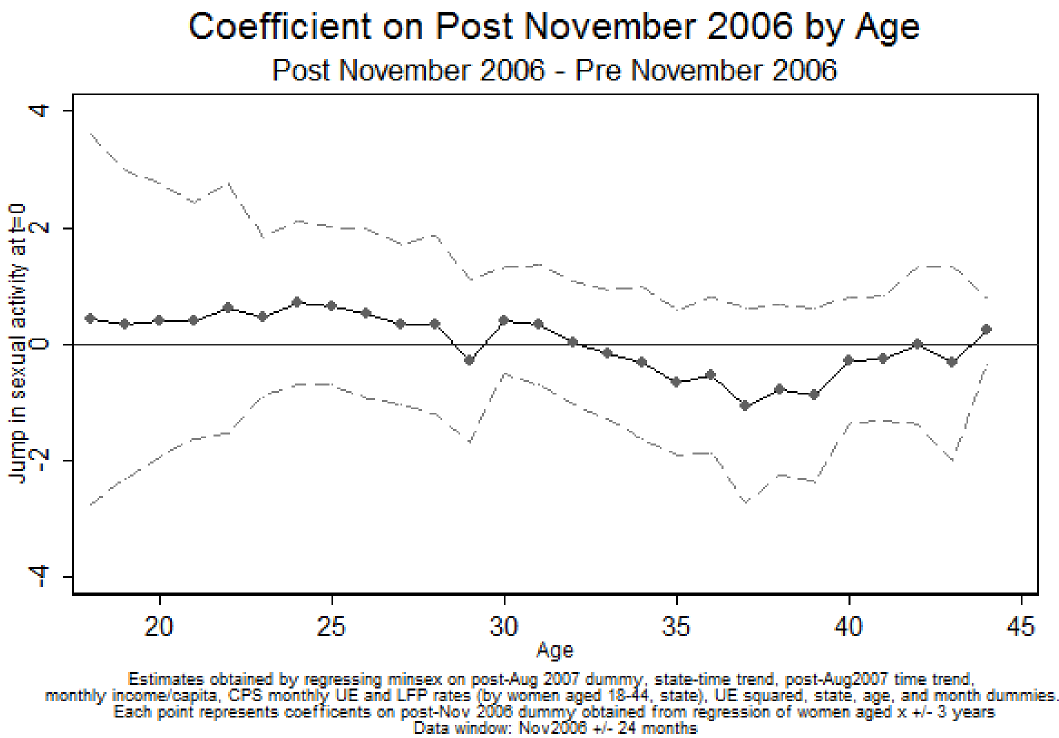
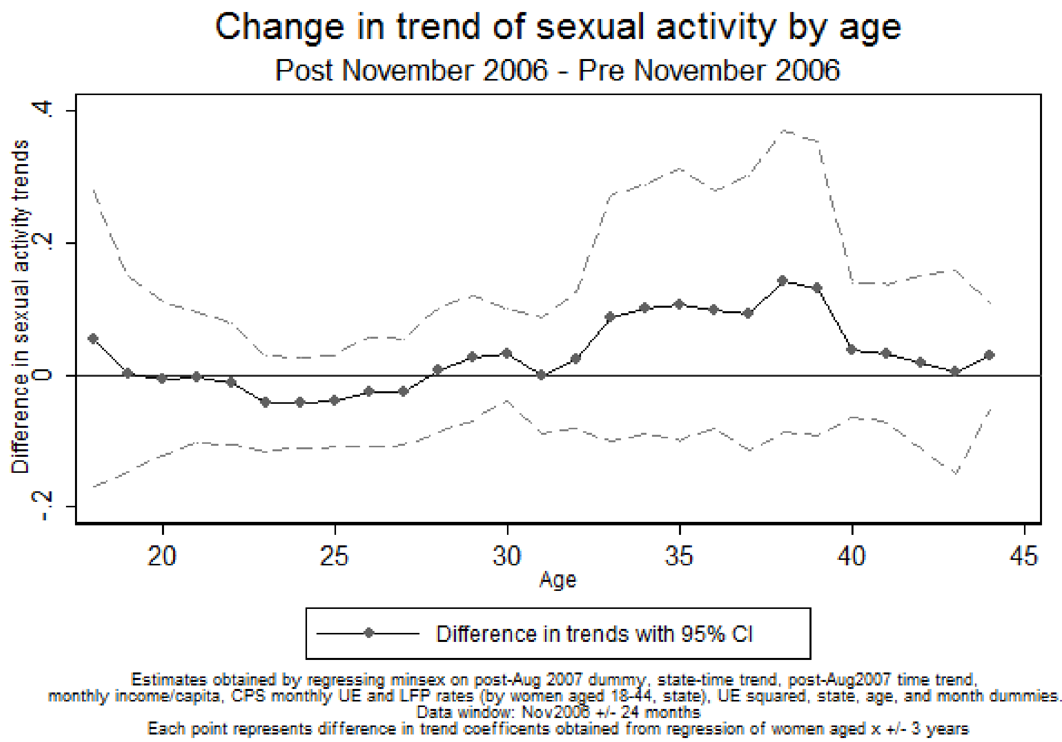


Figure 4: Evidence from the ATUS - Change in trend of sexual activity by Age



BRFSS - specification (1)

Table 14: Number of pregnancies per 1000 women by state ECP sales per capita quantiles

	(1) Below 25th	(2) 25th-50th	(3) 50th-75th	(4) 75th+
Difference in trends	-0.581	-0.747	-0.486	-0.908
	(0.541)	(0.974)	(0.449)	(0.795)
Post Aug2007 dummy	9.689	-1.333	-3.962	2.630
	(9.959)	(3.425)	(7.075)	(5.367)
Linear time trend	-0.075	0.100	0.443	0.186
	(0.627)	(0.658)	(0.322)	(0.639)
Business Cycle Controls	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes
Observations	14918	15307	15989	17359

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 15: Number of pregnancies per 1000 women: +/-20 month window

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.629	-1.711	0.077	-1.017	-0.362
	(0.595)	(1.214)	(0.449)	(0.936)	(0.584)
Post Aug2007 dummy	1.903	10.173	-3.282	8.026*	-1.669
	(3.294)	(7.446)	(2.800)	(4.761)	(4.603)
Linear time trend	0.197	-0.129	0.481	0.411	0.154
	(0.523)	(1.048)	(0.331)	(0.843)	(0.569)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	53250	22961	30289	43672	42693

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 16: Number of pregnancies per 1000 women - late-adopter states

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.699*	-1.725**	-0.033	-0.863*	-0.445
	(0.402)	(0.719)	(0.433)	(0.502)	(0.524)
Post Aug2007 dummy	1.138	8.126	-2.761	9.549*	-3.560
	(4.356)	(8.473)	(3.534)	(4.995)	(5.190)
Linear time trend	0.357	0.183	0.491	0.124	0.514
	(0.433)	(0.814)	(0.298)	(0.540)	(0.555)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	52228	22519	29709	42535	41889

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 17: Number of pregnancies per 1000 women - early-adopter states

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-1.636	-3.794**	0.031	-3.714**	0.338
	(1.081)	(1.401)	(0.968)	(1.480)	(0.724)
Post Aug2007 dummy	2.140	15.004**	-5.760	-1.389	7.390***
	(3.713)	(6.327)	(3.331)	(5.984)	(2.084)
Linear time trend	1.430*	2.924**	0.192	3.435**	-0.385
	(0.721)	(0.953)	(0.652)	(1.067)	(0.336)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	11345	4913	6432	9627	9042

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 18: Number of pregnancies per 1000 women by age bins

	(1) 18-23	(2) 24-29	(3) 30-34	(4) 35-39	(5) 40-44
Difference in trends	-2.572**	-1.948	-0.668	1.002*	0.000
	(1.232)	(1.280)	(1.128)	(0.503)	(0.193)
Post Aug2007 dummy	20.713	0.865	-21.497**	9.637	1.190
	(15.416)	(11.287)	(10.569)	(7.880)	(2.851)
Linear time trend	1.064	-0.252	1.907**	-0.606	-0.185
	(1.315)	(1.199)	(0.761)	(0.478)	(0.207)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	No	No	No	No
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	11232	13608	11897	12089	12155

1. Standard errors in parentheses, clustered by state. * $p<0.10$ ** $p<0.05$ *** $p<0.01$

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Table 19: Number of pregnancies per 1000 women - First treatment month: Apr2007

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.860*	-1.323	-0.505	-1.284	-0.318
	(0.446)	(0.934)	(0.377)	(0.802)	(0.578)
Post Apr2007 dummy	1.620	9.589	-3.287	3.719	0.503
	(2.878)	(5.984)	(3.110)	(4.057)	(3.371)
Linear time trend	0.590	0.306	0.802**	0.747	0.363
	(0.451)	(0.933)	(0.360)	(0.803)	(0.533)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	63836	27630	36206	52548	51269

1. Standard errors in parentheses, clustered by state. * $p<0.10$ ** $p<0.05$ *** $p<0.01$

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

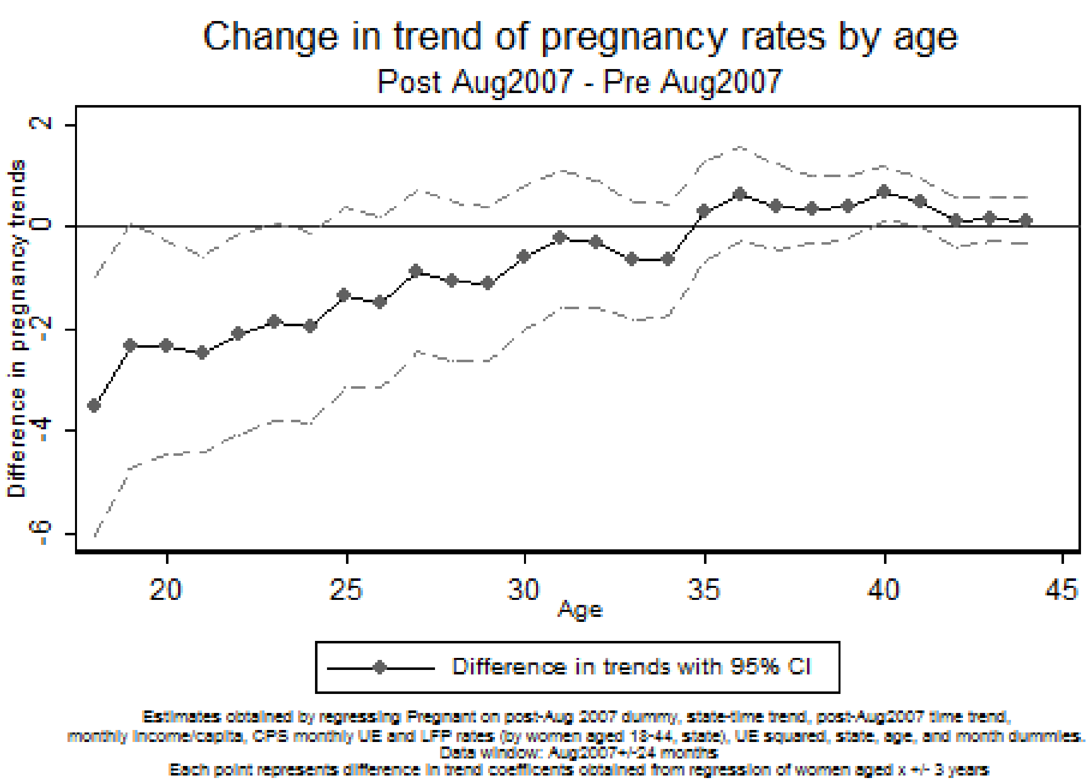
Table 20: Number of pregnancies per 1000 women - First treatment month: Jun2007

	(1) All	(2) Ages 18-29	(3) Ages 30-44	(4) Not married	(5) Married
Difference in trends	-0.836**	-1.715**	-0.214	-1.347*	-0.272
	(0.369)	(0.778)	(0.319)	(0.697)	(0.480)
Post Jun2007 dummy	2.337	14.988**	-5.515*	6.482**	-0.472
	(3.163)	(6.570)	(3.079)	(3.052)	(3.998)
Linear time trend	0.566	0.316	0.721**	0.691	0.436
	(0.350)	(0.743)	(0.289)	(0.644)	(0.464)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes
Age Dummies	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes
Month of Interview Dummies	Yes	Yes	Yes	Yes	Yes
Observations	63713	27541	36172	52330	51073

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = monthly UE, UE squared, LFP for women aged 18-44 by state, and monthly income/capita and income/capita squared

Figure 5: Evidence from the BRFSS - Change in trend of pregnancy rates by Age



Replication of other papers' specifications

Gross et al (2014) specification:

$$y_{st} = \beta * I\{ECStateLaw_{st}\} + X_{st} + \alpha_s + \alpha_t + \alpha_s t + \epsilon_{st}$$

Table 21: Number of pregnancies per 1000 women, Gross et al. (2014) EA specification

	(1) All	(2) Ages 18-30	(3) Ages 31-44	(4) All	(5) Ages 18-30	(6) Ages 31-44
Post treatment dummy	1.917	14.306***	-12.686***	6.998	19.459	-7.378***
	(2.282)	(4.089)	(1.772)	(6.826)	(11.376)	(0.695)
State-Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Year/Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16218	7671	8547	9925	4670	5255

1. Standard errors reported in paranthesis, clustered by state.

2. Business cycle controls = annual state UE and UE rates, monthly income/capita and income/capita squared and national monthly UE and UE squared rates

3. EA states: AK, CA, HI, ME, MA, NH, NM, VT, WA

4. Panels 1-3 contain years 1997-2005. Panels 4-6 contain treatment month +/- 24 months

Table 22: Number of pregnancies per 1000 women, Gross et al. (2014) LA specification

	(1) All	(2) Ages 18-30	(3) Ages 31-44	(4) All	(5) Ages 18-30	(6) Ages 31-44
Post Aug2007 dummy	4.265	5.594	3.580	2.622	2.517	1.790
	(4.024)	(8.377)	(2.682)	(5.487)	(11.289)	(3.500)
Business Cycle Controls	Yes	Yes	Yes	Yes	Yes	Yes
State-Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Month/Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78515	37116	41399	40533	18995	21538

1. Standard errors in parentheses, clustered by state. * p<0.10 ** p<0.05 *** p<0.01

2. Business cycle controls = annual state UE and UE rates, monthly income/capita and income/capita squared and national monthly UE and UE squared rates

3. EA states: AK, CA, HI, ME, MA, NH, NM, VT, WA

4. Panels 1-3 contains years 2004-2008. Panels 4-6 contain Aug2007 +/- 15 months

8 Data Appendix

The Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is currently the world's largest, ongoing telephone health survey system. Initiated in 1984 by the Centers for Disease Control and Prevention (CDC), BRFSS is a cross-sectional survey that state health departments conduct monthly to collect prevalence data among adults regarding their risk behaviors and preventive health practices. Most recently in 2012, over 500,000 interviews were conducted in the state, the District of Columbia, and participating U.S. territories.

The BRFSS questionnaire is comprised of an annual standard core, optional modules, and state-added questions. Standard core questions are asked every year in every state, while optional modules and state-added questions may be asked only in certain years and/or states. The questions we focus on for our paper come solely from the standard core, including the primary outcome variable of interest (pregnancy rate) and control variables (age, health care, race, geographic region).

We use the set of all interviews conducted in all months from 1997 through 2012. In order to be able to compare data between all years and draw generalized conclusions about the U.S. population, we use weights provided from the variable *_finalwt* for all regression analyses and plots. For our main outcome variable of interest, pregnancy rates, we look at the interview question asking "Are you now pregnant?". Women who responded with "Don't know/Not sure" or refused to answer the question are recorded as missing for this variable.

There were nine states that passed an OTC ECP policy prior to the 2006 FDA legislation: Alaska, California, Hawaii, Maine, Massachusetts, New Hampshire, New Mexico, Vermont, and Washington. For event study analyses, we assign time 0 as the first month of OTC access of the ECP. For each state, we set the first month with which the ECP was available OTC as the same month the legislation was passed if it was passed before the 15^{th} of that month; otherwise, if the legislation was passed on or after the 15^{th}, we assign the ECP as available in the subsequent month.

Using the survey question relating to marital status, we simply create a dummy variable *marital* equal to 1 if the respondent was married at the time of the interview and equal to 0 otherwise (respondent may be divorced, widowed, separated, never married, or a member of an unmarried couple). Those who refused to respond to the marital status question are recorded as missing for this variable.